I CLAIM:

1. A system processor for a navigation system, comprising in combination:

a plurality of radio frequency (RF) ranging systems operable to compute a heading;

a Kalman filter operable to calculate corrections to a navigation solution based on data received from a plurality of sensors, wherein the Kalman filter controls the plurality of RF ranging systems with the plurality of sensors;

mode logic operable to (i) select an operating mode of the navigation system and (ii) select which data the Kalman filter uses to calculate the corrections to the navigation solution, wherein the selections are based on which of the plurality of sensors is providing accurate data; and

a navigation computation element operable to calculate the navigation solution based on data provided by an inertial measurement unit and the corrections to the navigation solution provided by the Kalman filter.

2. The system of Claim 1, wherein the plurality of RF ranging systems is selected from the group consisting of a global positioning satellite receiver, Time Difference of Arrival, and Galileo.

3. The system of Claim 1, wherein the plurality of sensors is selected from the group

consisting of an accelerometer, a gyroscope, a magnetometer, and an air data computer.

4. The system of Claim 1, wherein the navigation solution is based on the operating mode of the navigation system as selected by the mode logic.

5. The system of Claim 4, wherein the operating mode is selected from the group consisting of deeply integrated mode, aiding mode, and standby mode.

6. The system of Claim 5, wherein the aiding mode includes the position velocity time (PVT) mode and the pseudorange/deltarange (PR/DR) mode.

7. The system of Claim 1, wherein the navigation solution is a three-dimensional position, three-dimensional velocity, and three-dimensional attitude solution.

8. The system of Claim 1, wherein the navigation solution is a three-dimensional attitude solution.

9. The system of Claim 1, wherein the mode logic uses resume logic to determine which of the plurality of sensors is providing accurate data.

10. The system of Claim 9, wherein the resume logic performs a validity check, a self-consistency check, and a Kalman filter prediction check to determine if the data is

accurate.

11. The system of Claim 1, wherein the mode logic includes a plurality of software switches.

12. The system of Claim 11, wherein one of the plurality of software switches selects navigation mode or standby mode.

13. The system of Claim 12, wherein the plurality of software switches selects deep integration mode, position velocity time (PVT) aiding mode, or pseudorange/deltarange (PR/DR) aiding mode in the navigation mode.

14. The system of Claim 13, wherein the Kalman filter transmits the corrections to the navigation solution to at least one numerically controlled oscillator command generator in the deep integration mode.

15. The system of Claim 14, wherein the at least one numerically controlled oscillator command generator adjusts replica code generators allowing the plurality of RF ranging systems to track multiple satellites.

16. A navigation system, comprising in combination:

a means of computing heading from a plurality of radio frequency (RF) ranging

systems;

a means for monitoring a plurality of sensors;

a means for controlling the plurality of RF ranging systems with the plurality of sensors;

a means for determining which of the plurality of sensors is providing accurate data;

a means for selecting data from sensors providing accurate data;

a means for selecting an operating mode of the navigation system; and

a means for calculating corrections to a navigation solution based on the selected data and the selected operating mode.

17. The system of Claim 16, wherein the plurality of RF ranging systems is selected from the group consisting of a global positioning satellite receiver, Time Difference of Arrival, and Galileo.

18. The system of Claim 16, wherein the plurality of sensors is selected from the group consisting of an accelerometer, a gyroscope, a magnetometer, and an air data computer.

19. The system of Claim 16, wherein resume logic determines which of the plurality of sensors is providing accurate data.

20. The system of Claim 19, wherein the resume logic performs a validity check, a self-consistency check, and a Kalman filter prediction check to determine if the data is accurate.

21. The system of Claim 16, wherein mode logic selects data from sensors that are providing accurate data and selects the operating mode.

22. The system of Claim 21, wherein the mode logic includes a plurality of software switches.

23. The system of Claim 22, wherein one of the plurality of software switches selects navigation mode or standby mode.

24. The system of Claim 23, wherein the plurality of software switches selects deep integration mode, position velocity time (PVT) aiding mode, or pseudorange/deltarange (PR/DR) aiding mode when in the navigation mode.

25. The system of Claim 16, wherein a Kalman filter calculates the corrections to the navigation solution.

26. A method of calculating corrections to a navigation solution based on accurate data, comprising in combination:

computing heading from a plurality of radio frequency (RF) ranging systems;

monitoring a plurality of sensors;

controlling the plurality of RF ranging systems with the plurality of sensors;

determining which of the plurality of sensors is providing accurate data;

selecting data from the sensors providing accurate data;

selecting an operating mode of a navigation system; and

calculating the corrections to the navigation solution using the selected data and the selected operating mode.

27. The method of Claim 26, wherein determining which of the plurality of sensors is providing accurate data includes:

performing a validity check,

performing a self-consistency check, and

performing a Kalman filter prediction check.

28. The method of Claim 27, wherein the validity check determines whether the data has been previously provided to the Kalman filter.

29. The method of Claim 27, wherein the self-consistency check determines whether the data is within a valid range of data from the sensor.

30. The method of Claim 27, wherein the Kalman filter prediction check determines

whether the data is within a percentage of a Kalman filter prediction.

31. The method of Claim 26, wherein the plurality of RF ranging systems is selected from the group consisting of a global positioning satellite receiver, Time Difference of Arrival, and Galileo.

32. The method of Claim 26, wherein the plurality of sensors is selected from the group consisting of an accelerometer, a gyroscope, a magnetometer, and an air data computer.

33. The method of Claim 26, wherein mode logic selects data from the sensors providing accurate data and selects the operating mode.

34. The method of Claim 33, wherein the mode logic includes a plurality of software switches.

35. The method of Claim 34, wherein one of the plurality of software switches selects navigation mode or standby mode.

36. The method of Claim 35, wherein the plurality of software switches selects deep integration mode, position velocity time (PVT) aiding mode, or pseudorange/deltarange (PR/DR) aiding mode when in the navigation mode.

37. The method of Claim 26, wherein a Kalman filter calculates the corrections to the navigation solution using state vector elements.

38. The method of Claim 37, wherein the state vector elements include vector elements for navigation errors, global positioning satellite oscillator errors, range bias states, and inertial sensor errors.